

C.C.R.

INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

This material contains information affecting the National Defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C. Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

S-E-C-R-E-T

25X1

COUNTRY USSR

REPORT

SUBJECT Soviet Water Power Planning
Organizations and Installations

DATE DISTR. 8 December 1958

NO. PAGES 1

REFERENCES RD

DATE OF
INFO.
PLACE &
DATE ACQ.

25X1

SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

25X1

Soviet water power planning organizations and water power installations

The report includes information on the central planning organization for the construction of hydroelectric power plants with headquarters in Moscow; a planning organization in Moscow which concerns itself with river problems; on the Moscow-Volga Canal; on a hydrotechnical institute, a metal works plant, and an electro-machine plant, all in Leningrad; on a hydroelectric power station under construction on the Volga River; hydroelectric power stations in the Georgian SSR; and on the hydroelectric power possibilities of the Sevan River in the Armenian SSR.

25X1

S-E-C-R-E-T

25X1

STATE	X	ARMY	X	NAVY	X	AIR	X	FBI		AEC									
(Note: Washington distribution indicated by "X"; Field distribution by "#").																			

INFORMATION REPORT INFORMATION REPORT

25X1

SECRET

25X1

*Attachment*U. S. S. R.EconomicAspects of Russian Water Power Installations and PlanningJune 19581. General

a) On the invitation of A. S. PAVLENKO, U. S. S. R. Minister for Power Stations, a group of [] engineers visited Soviet Russia from 25X1
3rd June to 27th June 1958 on an inspection tour of water power institutes and water power plants in operation or under construction.

b) The group went to MOSCOW, LENINGRAD, STALINGRAD and Georgia and Armenia.

c) Long distance travel was mostly done by air in TU 104 aircraft.

2. Water Power Planning

a) 'Hydro Energoprojekt', employing several thousands in its various project departments, is the central planning org [] for the construc- 25X1
tion of hydro-electric power plants. It has a HQ in MOSCOW and eight branches in the country (LENINGRAD, NIZHNIY NOVGOROD, TBILISI, EREVAN, TASHKENT etc.)

b) There is also 'Hydro Projekt', another planning org [] in 25X1
MOSCOW which solely concerns itself with river problems. This org []

[] was responsible for the KUIBYSHEV, STALINGRAD and Volga projects, as 25X1
well as large scale planning for multi-purpose installations on the rivers Yenisey and Angara in Siberia, which involved problems of irrigation, high water protection, navigation, power output and town construction.

3. MOSCOW and Area MOSCOW

The group visited

a) institutes and laboratories dealing with problems on hydro-
electric power and water courses

SECRET

/b)

25X1

SECRET

- b) 'Mos Energo' institute which had a load dispatcher for MOSCOW district
- c) a new 400 KV transformer station near MOSCOW, into which power at 400 KV is fed from KUIBYSHEV (in future also from STALLINGRAD), transformed and then passed into the MOSCOW district grid.
- d) the MOSCOW-VOLGA canal, built in 1932/34, primarily to ensure MOSCOW's water supply by pumping 100 cbm/sec. from the Valdai mountain range where the Volga has its source, into the canal. Carried by a system of locks, the additional water is fed into an artificial lake near MOSCOW. Its contents is turned over twice per annum for the supply of water to MOSCOW. Secondly, the canal with its large surface and wooded shores serves as a recreational area and thirdly as a means of transport.

4. LENINGRAD

The group visited:

- a) The 'All-Union Institute for Hydro Technics' which employs 17 professors, 111 scientists and 298 expert engineers. All aspects of power plant construction, including hydro technology and soil mechanics are studied. Interesting experiments with models of Francis turbines, 170 MW, 125 r.p.m., runner diameter 5,500 mm, height of fall 81 m, were carried out for future installations for China. As a special feature an experimental set-up was shown which creates water waves up to 20 cm (and later up to 50 cm) for the study of suitability of shore fortifications against storms.
- b) The 100 year old LENINGRAD Metal Works. This plant employs 15,000 men to make water turbines. Most recent production included 42 large Kaplan turbines for KUIBYSHEV and STALLINGRAD. At present drawing board work is done for BRATSK on the river ANGLA in Siberia, the

SECRET9863
/lar3cst

25X1

SECRET

largest Russian hydro electric power station scheduled for construction.

It will have 15 Francis turbines of 200 MW each, 125 r.p.m. and about 100 m. height of fall. Annual power output is to be over 20,000 million KWH.

The same types of turbines are also planned for KRA-SNOYARSK in Siberia.

Steam turbines produced at this plant were of normal type, i.e. 150 MW, 170 atmospheric pressure and 550 degrees Celsius. Steam turbines of 300 MW were under development and it was hoped to construct units of 500 to 600 MW, for over-critical pressure and maximum temperature, within six or seven years.

c) the Leningrad electro-machine plant 'Elektro-Silas', employing over 10,000 men. It is the largest factory for the construction of electro-machinery. Hydro generators, 105 MW and 68.2 r.p.m., for STALINGRAD were under construction as well as one turbo generator for 150 MW. Turbo generators up to 25 MW were air-cooled, over 25 MW hydrogen-cooled. A turbo generator of 300 MW under development had hydrogen cooled tubular conductors.

5. STALINGRAD

a) The air trip from EREVAN to STALINGRAD was made via ROSTOV as the runway at EREVAN was not long enough for the TU 104 aircraft.

b) The group visited the hydro power station which is under construction on the Volga, some 25 km up-river from STALINGRAD. When completed, it will be the largest low pressure power plant in the world, with an annual mean output of about 10,000 million KWH. The following data was made available:-

i) water 12,000 cbm/sec, mean high water 60,000 cbm/sec. 25X1

ii) 22 Kaplan units of 105 MW each mean height of fall 26 m.

iii) 28 weir apertures at 20 m inside width with simple flat sluices,

10 m high, adequate damming regulation by pulling or inserting

locking plates by means of a light crane, operated from the

weir bridge.

SECRET

/iv) 9823

25X1

25X1

SECRET

iv) Length of damming 600 km, damming contents 33,000 million cbm, runner diameter of turbine 9300 mm, normal cast steel turbine blades with chrome nickel steel sheet of 3 mm thickness welded on as reinforcement.

v) Each guide vane fitted with small oil servo motor to guarantee closing of vanes when turbine races. Although results with this method in KUIDYSHEV have not been satisfactory to date, further tests to improve method are in progress.

vi) generators are fitted with customary chain travel, excitation comes from grid-sterred rectifiers which are fed by a wave generator built into the main machine unit; ceiling voltage is four times excitation tension, specially high selected and in keeping with requirements for stability of load transmission of 400 KV and at about 1000 km., also built for extremely small reactances.

Known bars used for stator winding are not in mica jackets, but are insulated with mica bands under use of asphalt instead of shellac for binding.

vii) a new township bearing name of VOLSHSKY has been created for the 35,000 men engaged on the project, including theatres, cultural institutions, indoor swimming pools etc. Present plans envisage building of shipyards and other factories with a total population of 70,000 when power plant construction is complete.

6. GEORGIA

The group visited:

a) old hydro power station 'Sages' on river Kura, which constituted start of hydro power construction in Georgia. The plant had:-

1 Russian Francis turbine of 4 MW.

3 German " " " 4 "

1 Russian Kaplan " 12 "

25X1

SECRET

25X1

SECRET

25X1

b) hydro power station Chranges I with:

maximum gross height of fall 430 m

water 30 cbm/sec,

25X1

220 GWH annual output.

c) hydro power station Chranges II with:

equalising basin under construction,

water 46 cbm/sec

25X1

gross height of fall 330 m.

2 Francis units of 55 MW each

380 GWH.

d) 'Samgorski Cascade' on the river IYORI with its chain of hydro power stations. One power station of 10 MW under construction will, in conjunction with an earth dammed annual reservoir of 300 million cbm, regulate the flow of the IYORI river which is from 15 cbm/sec to 500 cbm/sec, and then irrigate large areas for the purpose of land recovery (50,000 ha). The three power stations below the 'cascade' have been installed for a total output of 40 MW. The regulated river flows into an artificial lake of several km in length which has been constructed near TBILISI to serve as recreational area for the town, to improve the climate and for purposes of afforestation.

e) 'Grus Energo', the installation for the supply of power to the Georgia land grid. It had a load dispatcher, operating on the same principle as the one seen at MOSCOW. Here mention was made for the first time of a frequency capacity regulator. While land grids operate independently of each other in the U.S.S.R., Georgia is supplied with power over a 200 KV line by Armenia which requires some form of frequency capacity regulation by having a Georgian power plant adjust its frequency so that the power from Armenia can be taken over. Frequency maintenance appears to be simple as

SECRET/larg^{C9853}

25X1

SECRET

large medium pressure installations are everywhere where machine units, in part remotely controlled, are switched on or off to maintain the desired frequency of the land grid. Normal synchronisation is hardly known in Russia. Machine sets, brought up to revolutions without excitation, are asynchronously linked to the grid via an output switch and only afterwards excitation is only subsequently given.

f) the water laboratory at TBILISI where at present experiments are made with a water lock of new shape for medium pressure installations.

7. ARMENIA

a) The group visited the Sevan Lake with its so-called "Rasdan Cascade".

b) The Sevan lake, lying about 2000 m above sea level between mountains of 4000 m in height disposes of a gross height of fall of 1000 m, with EREVAN about 1000 m. above sea level to the SOUTH of the lake. This fall is to be worked on nine levels, partly completed and partly under construction, allowing for a flow of water of 70 cbm/sec in upper levels and 62 cbm/sec in lower levels, diverting on the way 8 cbm/sec for irrigation purposes. This water carriage replaces the former natural outlet of the Rasdan river. The cascade is to produce about 2500 G/H at an installed capacity of about 325 MW at a cost of about 1750 million roubles, including 500 million roubles for roads, rail, settlements etc. The Rasdan cascade has a capacity of 5000 year hours. Only the three lowest levels are not operated during the summer, because all [] water is diverted from power generation to irrigation. Annual water carriage of cascade when completed will be 1200 million cbm at the rate of 1 cbm of water supplying about 2 K/H.

25X1

c) The flow of water into lake Sevan is estimated at 770 million cbm per annum. Annual precipitation over the lake is calculated at 550 million cbm per annum, thus making a total of about 1320 million cbm. The

/surprising

SECRET

SECRET

- 7 -

25X1

surprising feature, however, is that at present outflow amounts to only 50 million cbm and seepage to about 60 million cbm. The difference of some 1000 million cbm is ascribed to extraordinarily heavy evaporation. The lake surface is about 1400 sq.km. and only a small part of 280 sq.km. has a depth of 100 metres or more. It is planned to reduce the lake surface by one metre annually to a total of 50 metres, in order to reduce evaporation and to be able to take the whole of the 1200 million cbm water carriage without reducing the lake level. Scientific institutes, dealing with these problems, claim that this operation will not have an adverse climatic effect on the countryside.

END**SECRET**

9863

25X1